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Tongass
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North Revilla Final Environmental Impact Statement

Ketchikan Pulp Company
Long-Term Timber Sale Contract

SUMMARY

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ACRONYMS AND SYMBOLS

ADF&G	Alaska Department of Fish and Game
AHMU	Aquatic Habitat Management Unit
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
ASQ	Allowable Sale Quantity
BBF	One billion board feet
BMP	Best Management Practice
CEQ	Council on Environmental Quality
CFL	Commercial Forest Land
CFR	Code of Federal Regulations
CZMA	Coastal Zone Management Act of 1976
DBH	Diameter at Breast Height
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EVC	Existing/Expected Visual Condition
FEIS	Final Environmental Impact Statement
FSH	Forest Service Handbook
FSM	Forest Service Manual
GIS	Geographic Information System
IDT	Interdisciplinary Team
KPC	Ketchikan Pulp Company
KV	Knutsen-Vandenberg Act
LTF	Log Transfer Facility
LUD	Land Use Designation
LWD	Large Woody Debris (same as LOD)
MBF	One thousand board feet
MELP	Multi-Entry Layout Process
MIS	Management Indicator Species
MM	Maximum Modification
MMBF	One million board feet
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NMFS	National Marine Fisheries Service
NOI	Notice of Intent
P	Primitive
PR	Partial retention
R	Retention
RM	Roaded modified
RN	Roaded natural
ROD	Record of decision
ROS	Recreation Opportunity Spectrum
SHPO	State Historic Preservation Officer
SPM	Semi-primitive motorized
SPNM	Semi-primitive nonmotorized
TLMP	Tongass Land Management Plan
TRUCS	Tongass Resource Use Cooperative Survey
TTRA	Tongass Timber Reform Act
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFWS	United States Fish and Wildlife Service
VCU	Value Comparison Unit
VQO	Visual Quality Objective
WAA	Wildlife Analysis Area

Acknowledgements

Front cover: By Cindy Ross Barber, 1992. The cover design illustrates the range of interconnected issues addressed in this EIS.

Final Environmental Impact Statement

North Revilla

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Abstract

The USDA Forest Service proposes to harvest approximately 200 million board feet (MMBF) of timber in the North Revilla Project Area, Ketchikan Ranger District, Ketchikan Administrative Area, Tongass National Forest. Timber volume would be offered to the Ketchikan Pulp Company (KPC) under the KPC Long-term Timber Sale Contract (A10fs-1042), in a series of separate offerings ranging in size from 10 to 50 MMBF. The actions analyzed in this EIS are designed to implement direction contained in the Tongass Land Management Plan (TLMP, 1979a, as amended) and the Tongass Timber Reform Act. The EIS describes six alternatives which provide different combinations of resource outputs and spatial locations of harvest units. The alternatives include: 1) No Action, proposing no new harvest from the Project Area for the KPC Long-term Sale Contract at this time; 2) configure harvest units to provide the maximum amount of timber within Forest Plan standards and guidelines; 3) configure harvest units to emphasize timber sale economics and conventional cable yarding methods; 4) configure harvest units to emphasize wildlife habitat and maintain the integrity of large unfragmented blocks of old-growth forest; 5) configure harvest units to emphasize recreation and scenic quality; and 6) configure harvest units to emphasize a positive net economic return, while seeking to protect key recreation areas and reduce the harvest of high value wildlife habitat.

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Summary

Key Terms

Log Transfer Facility (LTF) - a facility used for transferring commercially harvested logs to and from a vessel or log raft, or the formation of a log raft.

Long-Term Contract - Long-Term Timber Sale Contract with Ketchikan Pulp Company

Management Indicator Species (MIS) - species of vertebrates and invertebrates whose population changes are believed to best indicate the effects of land management activities

Mitigation - measures designed to counteract environmental impacts or to make impacts less severe

Monitoring - process of collecting information to evaluate whether or not objectives of a project and its mitigation plan are being realized

Primary Sale Area - the KPC Long-term Sale Contract is comprised of Allotments E, F, and G and other areas within these allotments; the Project Area is within Allotment F

Riparian - transition zone between a stream or lake system and the adjacent land

Sawlog - that portion of a tree that is suitable in size and quality for the production of dimension lumber

Scoping - early and open activities used to determine the scope and significance of a proposed action

Subsistence - the customary and traditional uses by rural Alaskan residents of wild renewable resources for direct personal or family consumption and for customary trade

Utility log - those logs that do not meet sawlog grade but are suitable for production of firm useable pulp chips

Value Comparison Unit (VCU) - areas which generally encompass a drainage basin, containing one or more large stream systems; boundaries usually follow easily recognizable watershed divides.

Volume Classes - used to describe the average volume of timber per acre in thousands of board feet

Overview of the Project

The USDA Forest Service is proposing to harvest approximately 200 million board feet (MMBF) of timber from the North Revilla Project Area of the Tongass National Forest, Ketchikan Administrative Area, Ketchikan Ranger District. This Final Environmental Impact Statement (Final EIS) has been prepared in accordance with the National Environmental Policy Act (NEPA) to document the environmental and social consequences of this proposed action and alternative courses of action.

Summary

The project formally began on June 20, 1991, with the issuance of a Notice of Intent to proceed with the environmental analysis of the project. Public scoping was conducted during August 1991, via mailings and local news media, to solicit issues to be addressed in the Draft EIS. A second mailing on August 24, 1992 summarized the significant issues and tentative alternatives to be analyzed. It also provided an opportunity for people to indicate how they would like to continue participation in the North Revilla planning process. Responses to this mailing became the basis for the Distribution List used to mail copies or summaries of the Draft EIS as requested.

The Draft EIS was mailed to the Distribution List on December 17, 1992, and availability was announced in the *Federal Register* on December 24, 1992. Public comments were accepted until February 12, 1993. Subsistence hearings were held in Ketchikan (January 25, 1993) and Saxman (January 27, 1993).

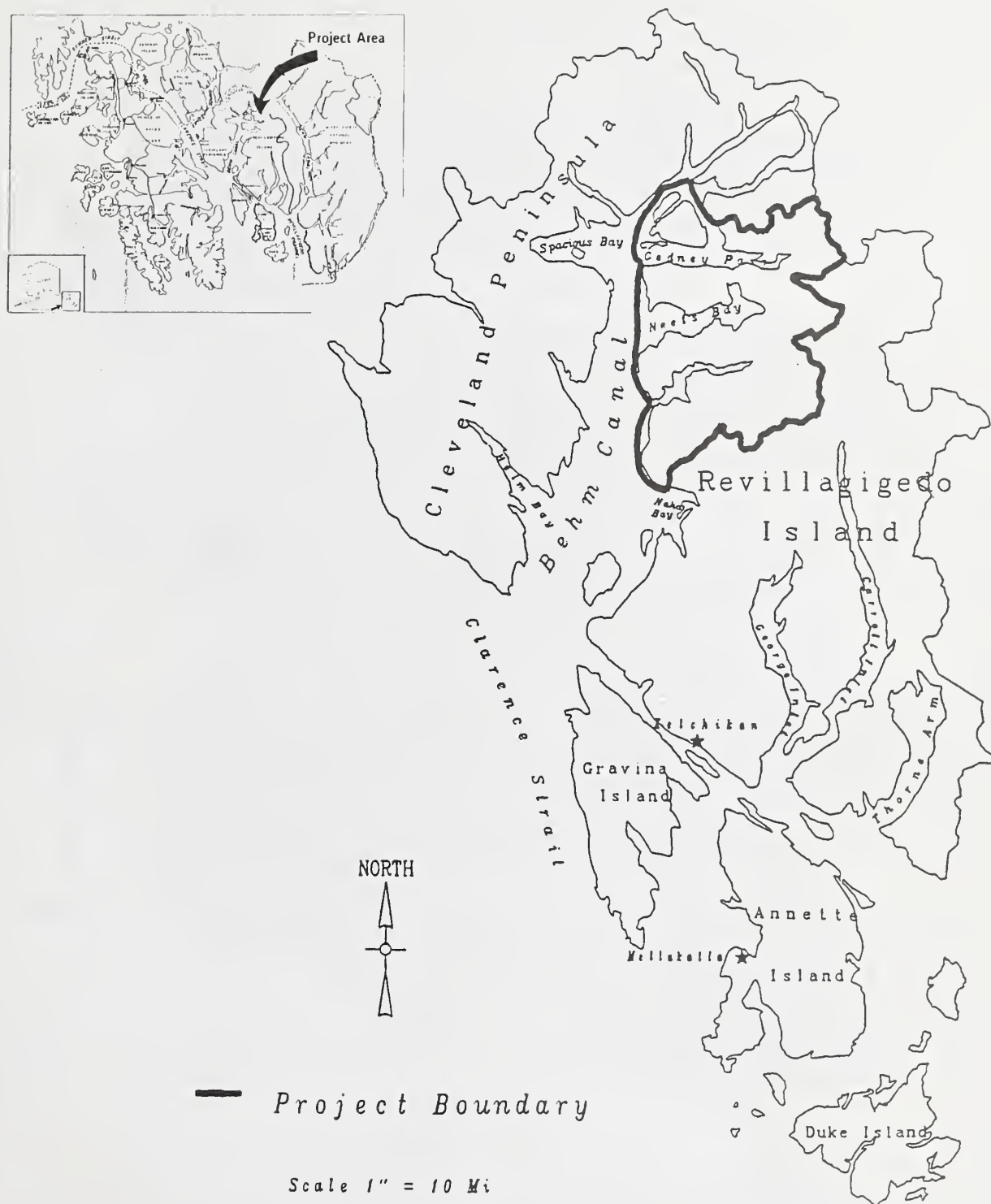
Approximately 875 individuals, agencies, and organizations submitted written comment on the North Revilla DEIS. In addition, 18 verbal testimonies were received at the two subsistence hearings. The 45-day public comment period officially closed February 12, 1993; however, all letters were accepted, and with the comments, analyzed and incorporated into the Final EIS as appropriate.

A third public mailing was sent to interested parties, providing an opportunity for people to indicate how they would like to continue participation in the North Revilla planning process. The mailing list consisted of the original list amended by responses to the public mailings and public hearings. Responses to the third public mailing will become the basis for the the Distribution List used to mail copies or summaries of the Final EIS

Project Area

The 109,520-acre Project Area is located approximately 30 air miles north of Ketchikan, Alaska. It encompasses an area of northwest Revillagigedo (Revilla) Island, from Indian Point on the southwest end to Beaver Creek on the northeast end, along the Behm Canal. It includes the drainages associated with Gedney Pass, Neets Bay, and Traitors Cove. The focus for this project is the area designated as the Primary Sale Area Allotment F for the Long-term Contract. See Figure Sum-1 for the Project Area vicinity map. The Project Area is entirely within the TLMP (1979a, as amended) Management Area K32, which is divided into eight Value Comparison Units (VCU's) whose boundaries usually follow watershed divides. These management areas include VCU's: 732, 733, 735, 736, 737, 738, 739, and 740. Figure Sum-2 illustrates VCU's within the Project Area.

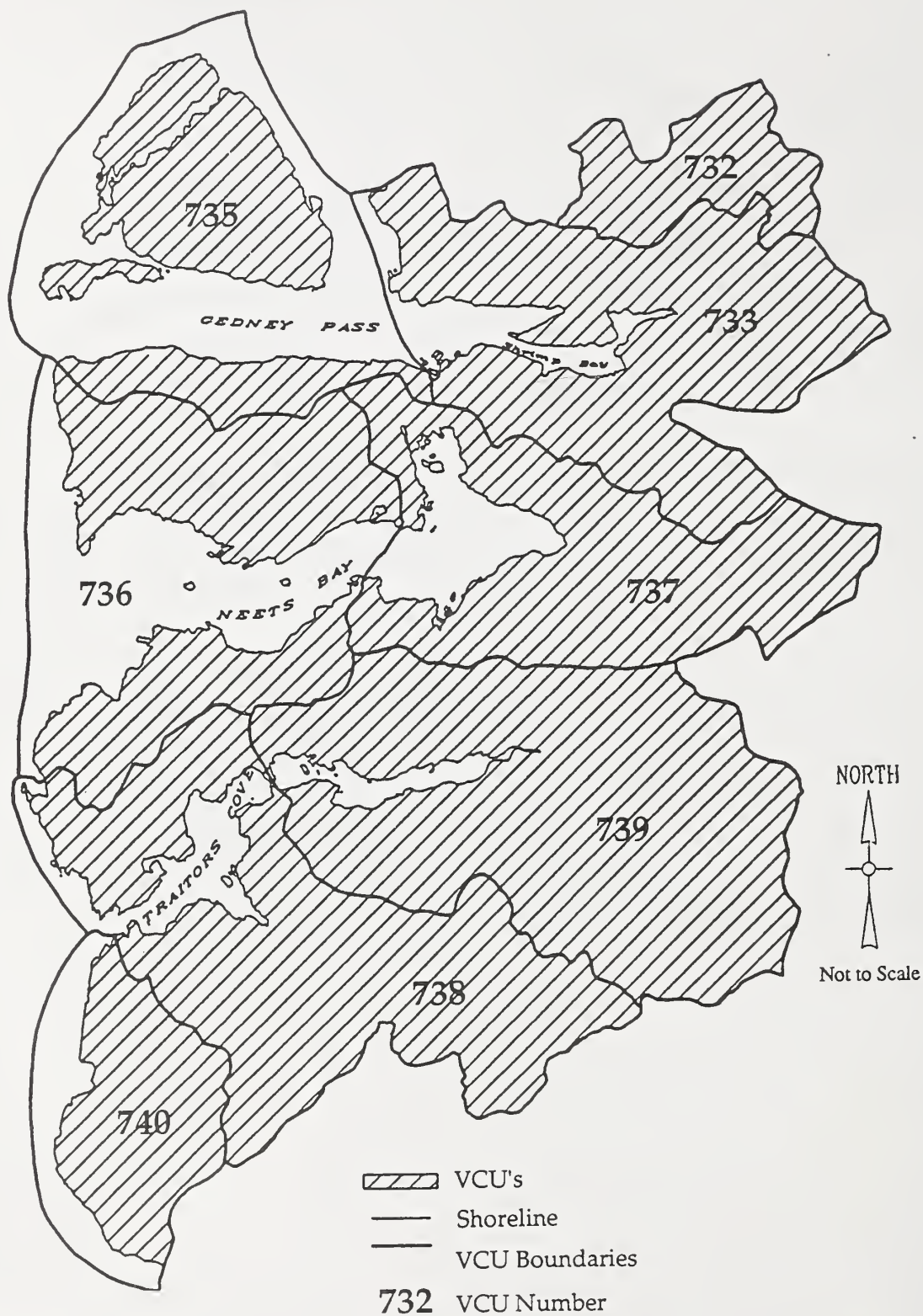
Figure Sum-1
Project Area Vicinity Map



The 109,520 acre Project Area is located approximately 30 miles north of Ketchikan

Summary

Figure Sum-2
North Revilla Project Area Value Comparison Units (VCU's)



Purpose of and Need for Action

This project is intended in part to help satisfy the three-year current timber supply requirement of the Long-Term Contract with the Ketchikan Pulp Company (KPC). There also is a need to help satisfy the obligation set by Congress under the Tongass Timber Reform Act (TTRA) of 1990, directing the Forest Service to seek to provide a supply of timber which meets annual market demand to the extent consistent with providing for the multiple use and sustained yield of all renewable forest resources.

For this project the volume has been determined to be approximately 200 MMBF, reflecting a management decision based on the most current schedule to provide a three-year timber supply of 615 MMBF for the KPC Long-Term Contract (Appendix A). The purpose and need is further to move to implement the TLMP (1979, as amended), thereby moving from the existing forest condition to the desired future condition, as specified in the TLMP Management Direction/Emphasis for the management areas within the Project Area.

Contract Obligations

The Long-Term Contract, originally signed in 1951 and modified most recently in 1991, calls for a total of 8.25 billion board feet of timber to be supplied to KPC. Under the terms of the modified contract, the Forest Service is required to "develop a tentative Offering schedule...[which] shall list sufficient timber volume and schedule commencement of the NEPA process...to provide [KPC] a Current Timber Supply sufficient for at least three years of operations...." Further, the Forest Service is required to "seek to specify sufficient Offerings to maintain a Current Timber Supply in all Offering areas that totals at least three years of operations...and which meets the production requirements of [KPC's] manufacturing facilities." The most recent three-year analysis of Current Timber Supply (15 February 1992) requires the Forest Service to seek to maintain an annual supply of 615 MMBF of harvestable timber that has been cleared through the NEPA process.

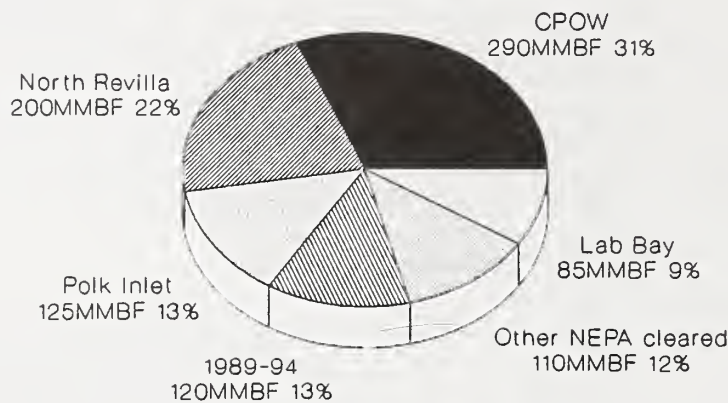
Four timber projects—North Revilla, CPOW, Polk Inlet, and Lab Bay—were initiated to contribute toward this timber supply. The goal of these projects was to provide timber which, when combined with the 120 MMBF remaining under the 1989-94 LTS EIS, would supply enough timber for the 1993 logging season (205 MMBF), plus the aforementioned 615 MMBF. The desired timber supply is therefore 820 MMBF, of which the four projects were to supply 700 MMBF. This 700 MMBF was divided among the four timber projects based on the size of the project areas, as well as on their relative abilities to produce timber in an expedient fashion.

Once these four projects were underway, delays were experienced in their completion. These delays were such that only limited volume could be made available from them for the 1993 logging season. This also had an effect of delaying the time when a three-year timber supply could be achieved. In an effort to provide enough volume for the 1993 logging season, and to stay on schedule for attaining a three-year timber supply, four independent sales were released to KPC. Figure Sum-3 illustrates the current and projected timber supply for the long-term contract with KPC.

Figure Sum-3

Current and Projected Timber Supply for the KPC Long-Term Contract

Total volume = 930 MMBF



Existing and Desired Future Condition

The existing condition of the Project Area is approximately 94 percent forested, with about 27 percent in noncommercial (scrub) timber, 15 percent in second growth, and 52 percent in old-growth commercial forest. The Neets Bay, Traitors Cove, and Margaret Bay valley bottoms along with the Gedney Pass shoreline, were extensively logged from the 1950's through the 1970's. A moderate amount of harvest occurred in the 1980's through portions of the Project Area. The majority of the second-growth sites are fully stocked stands, 20 to 30 years old and 20 to 40 feet tall. The Project Area contains 74,541 acres of commercial forest land, of which 56,927 acres of old-growth remain. Approximately 108 miles of road exists in the Project Area and will require reconstruction prior to use. Recreation use within the Project Area focuses on water related activities. The Project Area provides habitat for numerous wildlife species including deer, black bear, marten, and bald eagles. Salmon and native trout spawn in the numerous streams.

The desired future condition, as specified in the Management Direction/Emphasis for the management area, was established through the Forest planning process and is presented in the TLMP (1979a, as amended 1986). The management emphasis and direction was further refined as the Desired Future Condition in the TLMP Draft Revision (1991a). It consists of a mosaic of timber stands of varying sizes and ages, interspersed with areas of old growth and non-forest vegetation, furnishing a sustained yield of timber in balance with other resources and uses, including riparian areas, water quality, fish habitat, sensitive visual resources, recreation opportunities, and old-growth stands and their associated wildlife.

Proposed Action

The Tongass National Forest, Ketchikan Administrative Area, proposes to harvest approximately 200 MMBF of timber from an estimated 6,700 acres on Revillagigedo Island. This will be accomplished through a series of offerings, approximately 10 to 50 MMBF in size, beginning in 1993. Approximately 50 miles of existing road would be reconstructed and 100 miles of new road would be built to facilitate timber removal. Six Log Transfer Facilities (LTF's) would be constructed or reconstructed to implement the proposed action.

Decision to be Made

The Ketchikan Administrative Area Forest Supervisor will decide whether, when, and how to make timber available from the North Revilla Project Area to meet contractual commitments and implement the Forest Plan. The Forest Supervisor can decide to: (1) select one of the alternatives, including the no-action alternative, (2) modify an alternative as long as the environmental consequences of the modified action have been analyzed within the Final EIS, or (3) reject all alternatives. If an alternative is selected, it will be documented in the Record of Decision (ROD).

Issues

The significant issues, concerns, and opportunities were identified through the public and internal scoping process, public comment received on the Draft EIS, and subsistence testimonies. These are as follows:

1. Cost effectiveness of timber harvest operations
2. Impact of timber harvest operations on fish habitat and water quality
3. Impact of timber harvest operations on recreation and scenic quality
4. Impact of timber harvest operations on wildlife habitat
5. Impact of timber harvest operations on subsistence
6. Impact of timber harvest operations on social and economic effects
7. Impact of timber harvest operations on the marine environment

The following issues raised by the public were considered but eliminated from detailed study because their resolution is beyond the scope of this document:

8. TLMP Land-Use Designations should be changed to eliminate or reduce the level of harvest and/or maximize specific resources
9. Evaluate the transportation/utility corridor that would provide access from Ketchikan to the northern portion of the island and across the Bradfield Canal
10. The level of development outside the Project Area
11. Below-cost timber Sales should be eliminated
12. Regional timber supply and demand should be refigured for the North Revilla Project Area

Availability of Documents

The Planning Record documenting the process of producing this EIS is available for review during regular business hours at the Forest Supervisor's office, Ketchikan, Alaska. Copies of the complete Final EIS including appendices may be viewed at the Supervisor's Office or at public libraries and schools in the region, and are available upon request.

Development of Alternatives

Each action alternative presented in this EIS is a different response to the significant issues. For this EIS, five action alternatives were developed to meet the stated purpose and need of the project, while minimizing or avoiding environmental impacts. Each action alternative represents a site-specific proposal developed through intensive interdisciplinary unit and road design using high resolution topographic maps, GIS mapping capabilities, and new 1991 aerial photos coupled with resource inventories and site inspections.

Ecosystem Management

Ecosystem management seeks to focus research and management of the national forests to provide a full array of social values and benefits, with increased emphasis on fisheries, wildlife, recreation, ecological sustainability, and long-term productivity.

New perspectives is contained within the larger concept of ecosystem management. New perspectives is an attempt to use a variety of silvicultural strategies and re-evaluate older ones, to bring about a different balance in resource production in managed landscapes. The basic philosophy of new perspectives is to mimic natural ecological processes and maintain options for future management while we learn more about the impacts of our management on the ecosystem.

Ecosystem management looks at forest management on two levels: (1) the landscape level, which may be a geological province (geoprovince) or a large watershed; and (2) the stand level, which deals with individual harvest units. The forest plan incorporates ecosystem management at the landscape level through land use allocation and the development of Standards and Guidelines. This separates incompatible uses, and spreads impacts out over time and space. Many issues—such as maintaining large unfragmented blocks of old growth over time and maintaining the connectivity between those blocks—can only be resolved over the entire rotation through the land use allocation or forest planning process. A site-specific project level plan evaluates the assumptions made in a higher level plan. It then implements that direction and responds to public comments through the development of alternatives which determine which stands are treated and how they are managed. Some tools employed at the stand level may include a deferred entry, reducing harsh edges through unit placement, looking for opportunities to retain small patches of uncut timber in harvest units (where feasible and practical), maintaining existing travel corridors, leaving snags in harvest units (where safety regulations allow), and trying nonstandard harvest practices where resource issues and physical limitations permit.



©Frog

Alternatives Eliminated from Detailed Study

A number of alternatives were examined, but not considered for detailed study in this EIS. This section presents those alternatives and the rationale for not considering them further.

Alternative A

Single Resource or Issue Alternatives that focused upon one resource or issue were eliminated from consideration as implementable alternatives. While alternatives constructed around a single resource may not be implementable, the issue itself may still be significant. Each alternative will be evaluated against all the significant issues.

Alternative B

Transportation/Utility Corridor between Ketchikan and the Project Area The proposed road link and utility corridor are separate projects and independent from this EIS. The road link project is not reasonably foreseeable. The transportation/utility corridor is not a connected action, and will require a separate NEPA document displaying the issues and alternatives developed during the public involvement process.

Alternative C

Harvest in the Orchard Lake area The Interdisciplinary Team received numerous comments during scoping about the need to protect Orchard Lake. The same comments were received during the TLMP Revision process. Under Alternative P of the TLMP Draft Revision (1991a) the area is now proposed for management under the Semi-primitive Recreation (SP) management prescription, which does not allow for timber management. Forest transportation system linkages are allowed for under the Semi-primitive land use designation. However, no transportation linkages are proposed inside the management prescription boundary under any of the action alternatives at this time.

Alternative D

Inability to Meet the Purpose and Need Several public comments requested the Forest Service analyze a reduced harvest within the North Revilla Project Area. Because of the defined purpose and need of the project, a significantly lower volume alternative was not considered in detail. A significantly reduced level of harvest and change in management emphasis/direction would amount to a change in Land Use Designation. Land use designation (allocation) is a Forest planning issues and beyond the scope of this document.

Alternative E

Public Comment Alternative Several public comments requested the Forest Service eliminate specific areas or individual units that were of concern to them. For example, the Southern Southeast Aquaculture Association (SSRAA) identified units they felt posed a sedimentation risk to the fish hatchery at Neets bay, several elders from the community of Saxman identified important subsistence use areas, other individuals and groups identified units that they felt would negatively impact water quality, visual quality, or wildlife values. The North Revilla IDT decided to apply these comments against Alternative 2. Alternative 2 consists of 251 MMBF which represents the maximum amount of timber harvest that could be achieved and still meet Forest Plan standards and guidelines. After removing the units which were of

concern to the public, this alternative contained 92 harvest units, totaling 106 MMBF of sawlog plus utility volume from 3,637 acres. It proposed 30 MMBF scheduled for helicopter yarding. The overall nature of the alternative was fairly disjointed and would have been grossly uneconomical. This alternative was dropped from further consideration because it clearly failed to meet the stated purpose and need for the project.

The public comments were incorporated into the various alternatives to varying degrees. For example alternative 4 in the DEIS was dramatically altered to address wildlife and subsistence comments, while still meeting the purpose and need for the project. Alternatives 4, 5 and 6 all deferred harvest in the Traitors Cove Habitat Capability Area (HCA) wildlife block. The North West Traitors Cove (LTF #18) and North Traitors Cove (LTF #22) LTF's were dropped from all alternatives. Numerous other changes were incorporated into each individual alternative based in part on public comments received on the Draft EIS.

Alternatives Considered for Detailed Study

Six alternatives for making timber available to KPC from the North Revilla Project Area were considered in detail. Each alternative is consistent with the TLMP (1979a, as amended) and Alternative P of the TLMP Draft Revision (1991a). For each alternative this section provides a discussion of: (1) the emphasis or intent of the alternative, and (2) various resource outputs associated with implementation. Alternatives are compared in detail later in this chapter and summarized in Table Sum-1.

Alternative 1 (No Action)

Emphasis The emphasis of this alternative is to propose no new timber harvest from the North Revilla Project Area for the Long-Term Contract at this time. It does not preclude timber harvest from other areas at this time, or from the North Revilla Project Area at some time in the future. The CEQ regulations 40 CFR 1502.14d requires a "No Action" alternative be analyzed in every EIS to serve as a benchmark by which effects of the other action alternatives are to be measured. The Existing Condition map (Alternative 1), in the separate map packet, shows the distribution of vegetation associated with no new timber harvest.

Outputs There are no new timber harvest outputs associated with this alternative. Visual quality, wildlife habitat quality, semi-primitive recreation opportunities, as well as other resource values would remain at their current condition.

Alternative 2

Emphasis The emphasis of this alternative is to accelerate progress toward the desired future condition for timber management while meeting Forest Plan Standards and Guidelines for other resources. Timber volume made available to KPC is maximized this entry under this alternative. This alternative is designed to evaluate the effects of harvesting as much of the Project Area as possible in a combination that still meets standards and guidelines. This alternative serves as an upper level benchmark that can be used to project the cumulative affects of the reasonably foreseeable future activities (see Appendix A) within the Project Area.

Outputs Implementation of this alternative would schedule the harvest of 8,232 acres, in 205 harvest units for approximately 251 MMBF of sawlog and utility volume,

indicating and average unit size of 40.2 acres. Of this harvest, 9 units totaling 295 acres are planned for partial cut; the remainder are planned for clearcut harvest. To implement this level of harvest 153.4 miles of new road would be constructed, and 45.6 miles of existing road would require reconstruction. Road construction clearing will yield an additional 16 MMBF of right-of-way (ROW) volume. This indicates an average of 1.7 MMBF per mile of new road construction and a total of 1.3 MMBF per mile of road. It schedules 1,711 acres or 51.8 MMBF of volume for helicopter yarding. Preliminary analysis indicates a net mid-market stumpage value of \$-18.84 per MBF.

The development of one new Log Transfer Facility (LTF) and six existing LTF's will be required to implement this alternative. Floating logging camps are anticipated with the Margaret, Fire Cove and Shrimp bay LTF's. The road connection between Margaret Bay and Fire Cove (Traitors Creek) would eliminate the need for an additional floating camp at Fire Cove. The Alternative 2 map provides the spatial relationship among roads, units and other geographic features of the North Revilla Project Area.

Alternative 3

Emphasis The objective of this alternative is to emphasize timber economics and conventional cable yarding methods. The location of harvest units, selection of silvicultural prescriptions, logging systems, and a transportation network is primarily based on maximizing the mid-market value. This entry does not propose any helicopter timber harvest. This approach emphasizes a positive net economic return for the proposed harvest units, by seeking to minimize logging and road construction costs.

Outputs Alternative 3 schedules the harvest of 124 individual harvest units, totaling 174 MMBF of sawlog and utility volume from 5,734 acres, indicating an average unit size of 46.2 acres. Of this harvest no partial cutting or helicopter yarding is proposed. This alternative requires the construction of 103.0 miles of new specified roads plus 32.3 miles of reconstruction. Road construction clearing will yield an additional 8 MMBF of right-of-way (ROW) volume. This indicates an average of 1.8 MMBF per mile of new road construction and a total of 1.3 MMBF per mile of specified road. Preliminary analysis indicates a net mid-market stumpage value of \$16.03 per MBF.

The development of one new Log Transfer Facility (LTF) and six existing LTF's will be required to implement this alternative. Floating logging camps are anticipated with the Margaret, Fire Cove and Shrimp bay LTF's. The road connection between Margaret Bay and Fire Cove (Traitor's Creek) and the Shrimp Bay to Bluff Lake road connections would not be built as part of this alternative. The Alternative 3 map, provides the spatial relationship among roads, units and other geographic features of the North Revilla Project Area.

Alternative 4

Emphasis The emphasis of this alternative is to meet the stated purpose and need while configuring planned harvest units throughout the Project Area to reduce harvest of high value wildlife habitat and to maintain the integrity of large, unfragmented blocks of old-growth forest to the extent practicable. This approach emphasizes a deferral of harvest within the most valuable wildlife habitats, subsistence use areas, and seeks to minimize the effects of forest fragmentation.



Outputs Alternative 4 schedules the harvest of 123 individual harvest units, totaling 178 MMBF of sawlog plus utility volume from 5,920 acres, indicating an average unit size of 48.1 acres. Of this harvest, 5 units totaling 204 acres are planned for partial cut; the remainder are planned for clearcut harvest. This alternative requires the construction of 94.8 miles of new specified roads plus 26.2 miles of reconstruction. Road construction clearing will yield an additional 9 MMBF of right-of-way (ROW) volume. This indicates an average of 2.0 MMBF per mile of new road construction and a total of 1.5 MMBF per mile of specified road. It schedules 1,545 acres or 47.2 MMBF of volume for helicopter yarding. Preliminary analysis indicates a net mid-market stumpage value of \$-4.63 per MBF.

The development of one new Log Transfer Facility (LTF) and five existing LTF's will be required to implement this alternative. Floating logging camps are anticipated with the Margaret, Fire Cove and Shrimp bay LTF's. The road connection between Margaret Bay and Fire Cove (Traitors Creek) would not be built under this alternative. The Alternative 4 map provides the spatial relationship among roads, units and other geographic features of the North Revilla Project Area.

Alternative 5

Emphasis The emphasis of this alternative is to meet the stated purpose and need while configuring planned harvest units throughout the Project Area to minimize impact on visually sensitive areas. Units will be more dispersed, less visible and are designed to blend into the characteristic landscape.

Outputs Alternative 5 schedules the harvest of 188 individual harvest units, totaling 193 MMBF of sawlog plus utility volume from 6,424 acres, indicating an average unit size of 34.2 acres. Of this harvest, 6 units and 143 acres are planned for partial cut; the remainder are planned for clearcut harvest. This alternative requires the construction of 136.5 miles of new specified roads plus 36.9 miles of reconstruction. Road construction clearing will yield an additional 15 MMBF of right-of-way (ROW) volume. This indicates an average of 1.5 MMBF per mile of new road construction and a total of 1.2 MMBF per mile of road. It schedules 830 acres or 24.4 MMBF of volume for helicopter yarding. Preliminary analysis indicates a net mid-market stumpage value of \$-22.53 per MBF.

The development of one new Log Transfer Facilities (LTF) and six existing LTF's will be required to implement this alternative. Floating logging camps are anticipated with the Margaret, Fire Cove and Shrimp bay LTF's. The road connection between Margaret Bay and Fire Cove (Traitors Creek) would not be built under this alternative. The Alternative 5 map, provides the spatial relationship among roads, units and other geographic features of the North Revilla Project Area.

Alternative 6

Emphasis The emphasis of this alternative is to meet the defined purpose and need by configuring planned harvest units throughout the Project Area to provide for an economically viable timber harvest, while seeking to minimize the effects on high value wildlife habitat, key recreation and ongoing research areas (Margaret Lake Fish Pass).

Outputs Alternative 6 schedules the harvest of 137 individual harvest units, totaling 198 MMBF of sawlog plus utility volume and 6,568 acres indicating an average unit size of 47.9 acres. Of this harvest, 4 units totaling 222 acres are planned for partial cut; the remainder are planned for clearcut harvest. It proposes 1,113 acres and 33.9

MMBF of helicopter yarding. This alternative requires the construction of 97.7 miles of new specified roads plus 33.6 miles of reconstruction. Road construction clearing will yield an additional 8 MMBF of right-of-way (ROW) volume. It achieves 2.1 MMBF per mile of new road construction and 1.6 MMBF per mile of specified road construction. Preliminary analysis indicates a net mid-market stumpage value of \$17.50 per MBF.

The development of one new Log Transfer Facility (LTF) and six existing LTF's will be required to implement this alternative. Floating logging camps are anticipated with the Margaret, Fire Cove and Shrimp Bay LTF's. The road connection between Margaret Bay and Fire Cove (Traitors Creek) and the Shrimp Bay to Bluff Lake road connections would not be built as part of this alternative. The Alternative 6 map provides the spatial relationship among roads, units and other geographic features of the North Revilla Project Area.

Preferred Alternative

Using an evaluative process that compares the benefits and adverse effects of each alternative against the issues, the USDA Forest Service has identified Alternative 6 as the preferred alternative for this EIS. A final determination will be made by the Ketchikan Area Forest Supervisor in the Record of Decision (ROD).

Summary Comparison

Table Sum-1 provides a summary of outputs and environmental consequences by which the alternatives may be compared.



Summary

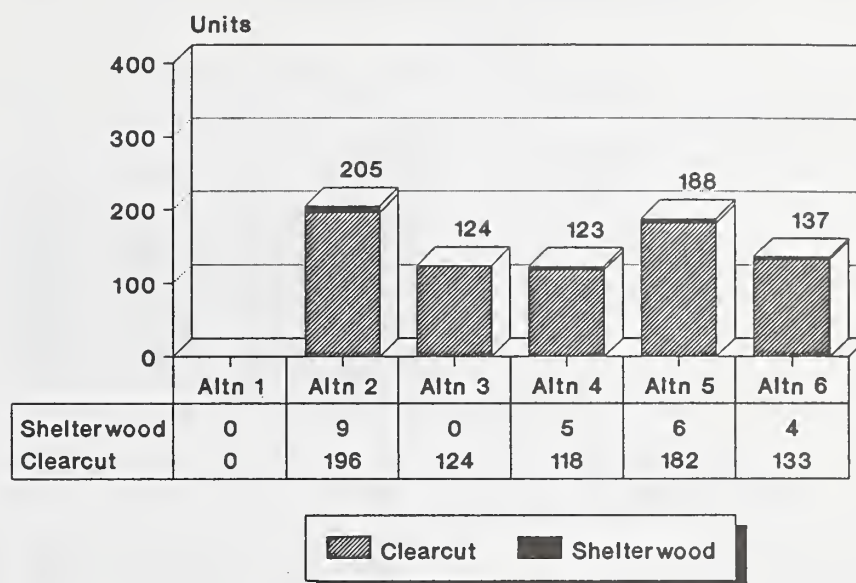
Table Sum-1
Summary Comparison of Alternatives

Activity	Units	Alternatives					
		1	2	3	4	5	6
Timber							
Units	Number	0	205	124	123	188	137
Estimated harvest unit volume	MMBF	0	251	174	178	193	198
Estimated right-of-way (ROW) volume	MMBF	0	16	8	9	15	8
Partial cut (shelterwood)	Acres	0	295	0	204	143	222
Clearcut harvest	Acres	0	7,937	5,734	5,716	6,281	6,346
Total harvest	Acres	0	8,232	5,734	5,920	6,424	6,568
Units over 100 acres	Number	0	8	9	7	4	7
Highlead harvest	MMBF	0	78.0	66.7	39.3	66.7	61.9
Running Skyline	MMBF	0	84.8	71.9	62.5	69.9	68.4
Live Skyline (Shotgun)	MMBF	0	1.6	0.5	1.3	2.4	1.2
Slackline harvest	MMBF	0	34.5	35.0	27.5	29.4	33.1
Helicopter harvest	MMBF	0	51.8	0	47.2	24.4	33.9
Estimated stumpage	\$ / MBF	0	-18.84	+16.03	- 4.63	-22.53	+17.50
Proposed Proportionality Remaining	Percent	8.86	8.82	8.87	8.91	9.05	8.95
Receipts to State of Alaska	\$M	0	5,969	5,048	4,094	4,975	5,046
Avg. annual jobs over 4 years	# of jobs	0	579	395	405	450	448
Roads & Transportation							
Specified road constr.	Miles	0	153	103	95	137	98
Road reconstruction	Miles	0	46	32	26	37	33
New Log Transfer Facilities	Each	0	1	1	1	1	1
Reconstruction of Log Transfer Facilities	Each	0	6	6	6	6	6
Margaret/Fire Cove Road connection	Miles	0	1.0	1.7	0	2.5	1.7
Margaret/Fire Cove Road connection	\$M	0	\$ 350	\$ 520	\$ 0	\$ 710	\$ 520
Shrimp/Bluff road connection*	Miles	0	12.3	0.8	8.3	12.1	0.8
*(Cost included in stumpage)							
Roads crossing Cl.I,II streams	Number	0	80	52	60	71	52
Biodiversity							
High & Moderate use subsistence (TRUCS)	Acres harvested	0	0	0	0	0	0
Unfragmented old-growth blocks >10,000 Ac.	Acres	49,505	31,184	34,716	33,241	34,584	32,997
Old Growth Acres Remaining	Acres	56,927	48,342	51,158	50,043	49,759	50,251
Wildlife - Project Area							
1997 MIS - deer	Habitat capability	1,700	1,592	1,615	1,617	1,628	1,602
1997 MIS - bear	Habitat capability	182	180	181	181	180	180
1997 MIS - marten	Habitat capability	144	127	131	133	132	130
1997 MIS - river otter	Habitat capability	66	65	65	65	65	65
1997 MIS - hairy woodpecker	Habitat capability	1,051	874	919	933	921	909
1997 MIS - Vancouver Canada goose	Habitat capability	243	219	227	225	223	222
1997 MIS - bald eagle	Habitat capability	137	135	136	136	136	136
1997 MIS - brown creeper	Habitat capability	1,338	1,131	1,192	1,205	1,197	1,178
1997 MIS - red squirrel	Habitat capability	70,793	63,214	63,635	63,750	63,627	63,540
1997 MIS - gray wolf	Habitat capability	4	4	4	4	4	4
Soils							
Very high mass movement	Acres harvested	0	216	225	203	162	266
High mass movement	Acres harvested	0	4,047	2,317	2,833	3,158	2,162
Medium mass movement	Acres harvested	0	2,380	2,025	1,414	1,809	2,162
Low mass movement	Acres harvested	0	1,533	1,174	1,356	1,251	1,301
Wetlands harvested/roaded	Acres	0	3,413	1,568	1,577	2,202	1,749
Roadless Areas							
Change in ROS class from SPNM to RM	Acres	0	15,605	7,216	12,190	11,788	9,403
Roadless areas	Acres (thousands)	61,394	43,345	52,843	48,672	47,734	51,930
Recreation places with some harvest	Number	0	12	11	10	12	11
Harvest in Orchard Lake viewshed	Acres	0	0	0	0	0	0

Comparison of Alternatives by Proposed Activity

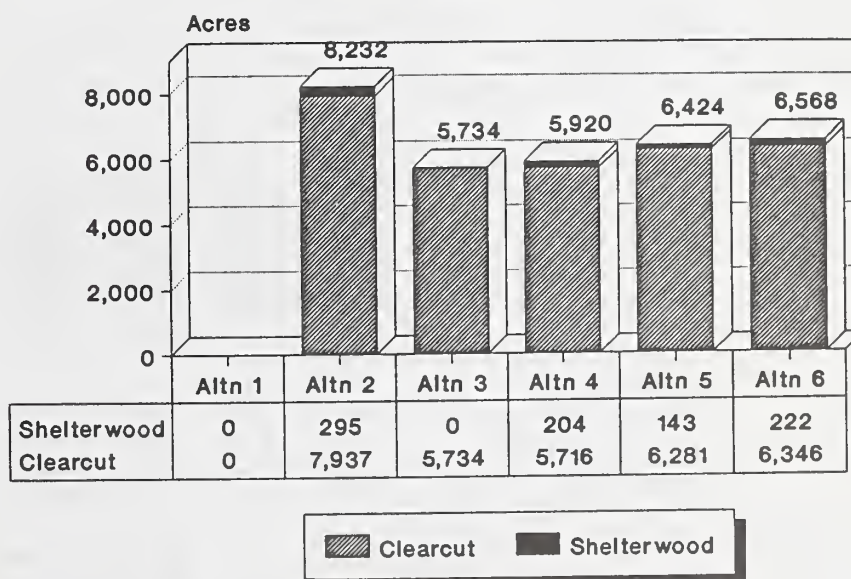
The action alternatives propose the harvest of from 123 to 205 individual units. Alternative 2 proposes the most units for partial cutting (9), while Alternative 3 proposes no partial cutting. Figure Sum-4 shows the number of units proposed for harvest under each alternative, by silvicultural system.

Figure Sum-4
Number of Units Proposed for Harvest, by Silvicultural System



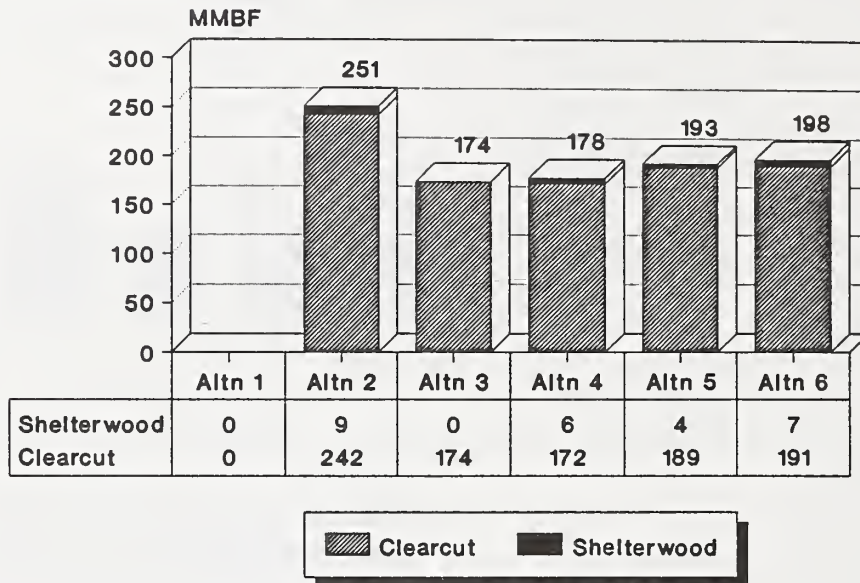
Each action alternative, with the exception of Alternative 2, proposes approximately 6,000 acres of timber harvest. Figure Sum-5 shows the number of acres proposed for harvest by each alternative by silvicultural system.

Figure Sum-5
Total Acres Proposed for Harvest, by Silvicultural System



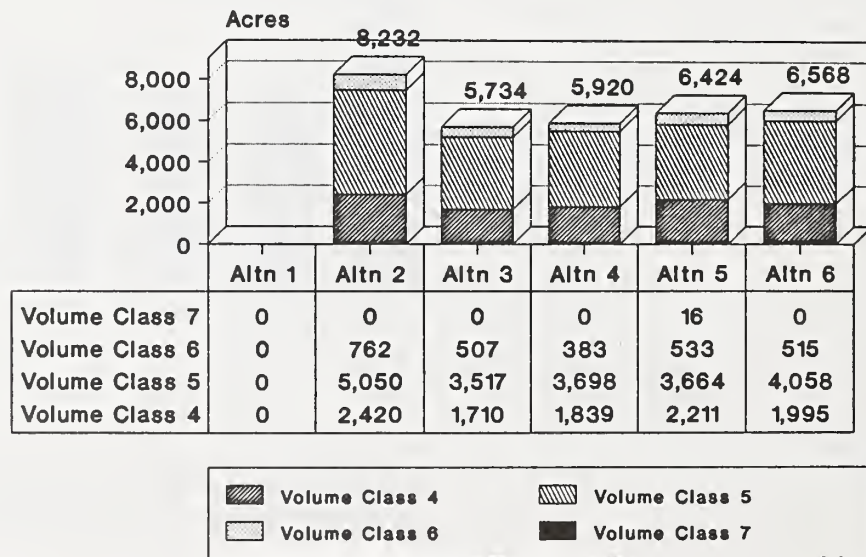
Excluding right-of-way volume each action alternative, except Alternative 2, generated slightly less volume than the identified purpose and need of 200 MMBF. Alternative 3 comes within 13 percent at 174 MMBF and Alternative 2 exceeds by 26 percent with 251 MMBF. Figure Sum-6 shows the volume of timber proposed for harvest by each alternative by silvicultural system.

Figure Sum-6
Total Volume Proposed for Harvest



Commercial forest land is divided into Volume Class Strata according to the Ketchikan Area's timber type map. This volume class information is used in calculating volume harvested and economic analysis. Figure Sum-7 shows volume class strata breakdown for each alternative.

Figure Sum-7
Proposed Harvest by Volume Class Strata



Summary

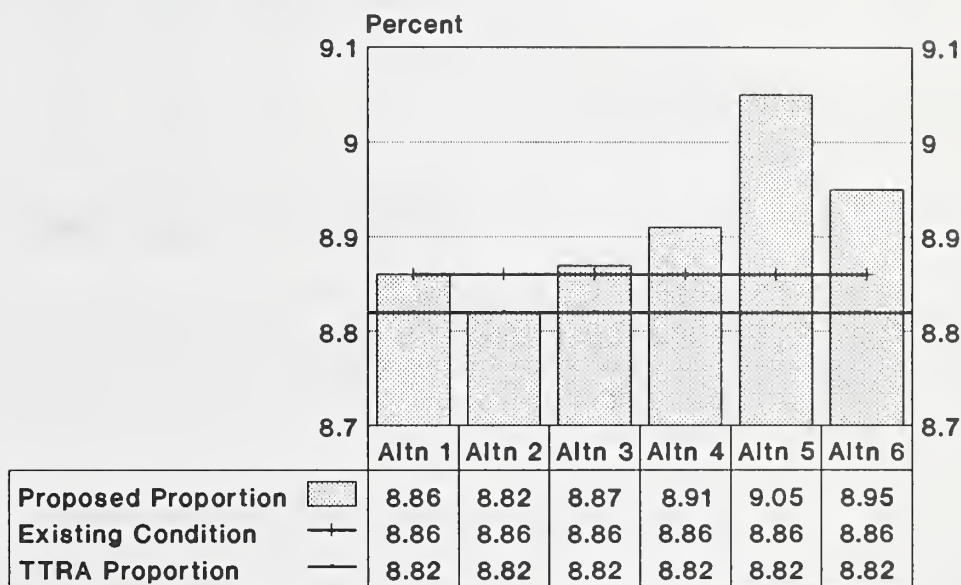
The Tongass Timber Reform Act of 1990 modified the long-term contracts to:

Eliminate the practice of harvesting a disproportionate amount of old-growth timber by limiting the volume harvested over the rotation in Volume Classes 6 and 7, as defined in TLMP and supporting documents, so that the proportion of volume harvested in these classes within a contiguous Management Area does not exceed the proportion of volume currently represented by these classes within the Management Area.

The Project Area is completely within Management Area K32 and contained 8.82 percent proportion of volume class 6 and 7 timber, as of November 1990 (Date TTRA became law). The current proportionality is 8.86 percent. All alternatives would result in a proportionality in excess of 8.82 percent and will meet the intent of the TTRA.

Figure Sum-8

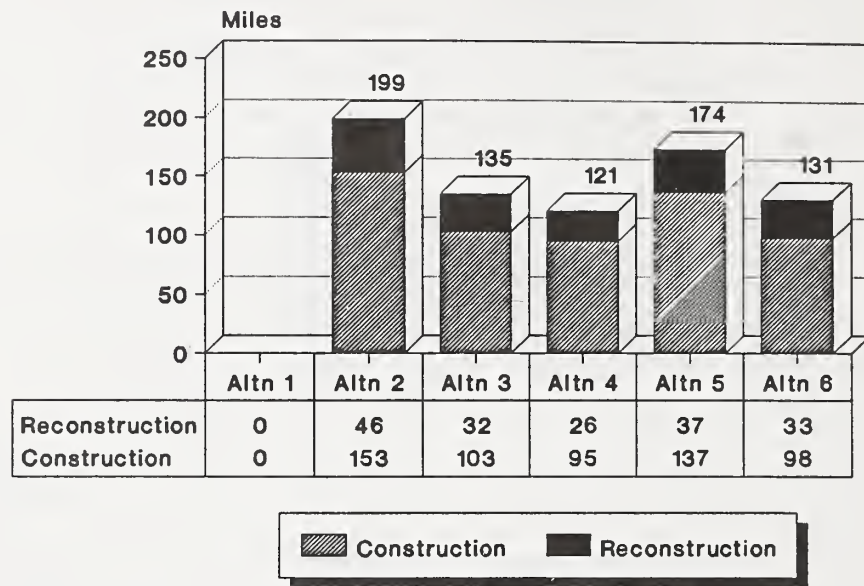
Proportion of Volume Class 6 & 7 Remaining after Harvest



Summary

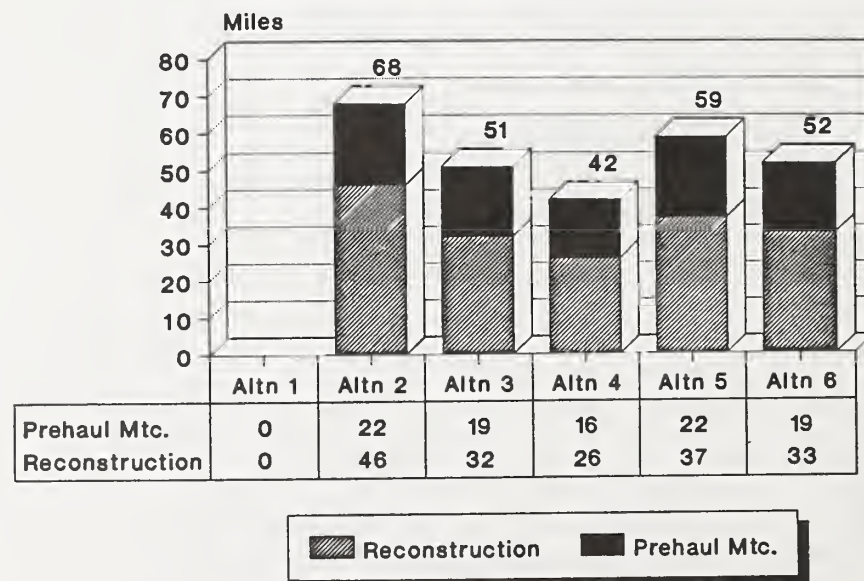
Road development is divided into two main categories—construction and reconstruction. Figure Sum-9 shows the number of miles of new road construction and reconstruction proposed to access the harvest units for each alternative.

Figure Sum-9
Proposed New Road Construction & Reconstruction



Road reconstruction and prehaul maintenance are used to describe the intensity of effort and materials necessary to rebuild the existing roads to meet Forest Service standards for log haul. Figure Sum-10 shows the number of miles of road reconstruction and prehaul maintenance necessary to access the harvest units for each alternative.

Figure Sum-10
Proposed Road Reconstruction & Prehaul Maintenance



Summary

There are up to six existing LTF's and one new LTF required to harvest the timber proposed for each alternative. This analysis has roughly estimated which units or groups of harvest units would most economically be hauled to a given LTF. Actual haul may be different. Table Sum-2 shows the volume of harvest projected to be hauled to each LTF.

Table Sum-2
Proposed Harvest, by Existing & New Log Transfer Facility, in MMBF

	Alt.1	Alt.2	Alt.3	Alt.4	Alt.5	Alt.6
Hassler Island	0	19	17	19	9	20
Klu Bay	0	22	10	14	21	16
Shrimp Bay	0	30	11	39	37	14
Chin Point*	0	16	18	17	11	19
Fire Cove	0	63	54	24	51	56
SW Neets	0	19	19	0	16	20
Margaret Bay	0	71	45	52	48	48
Log barge**	0	11	0	12	0	6

SOURCE: Rhodes, 1993

* New Log Transfer Facilities

** Helicopter logging to a barge

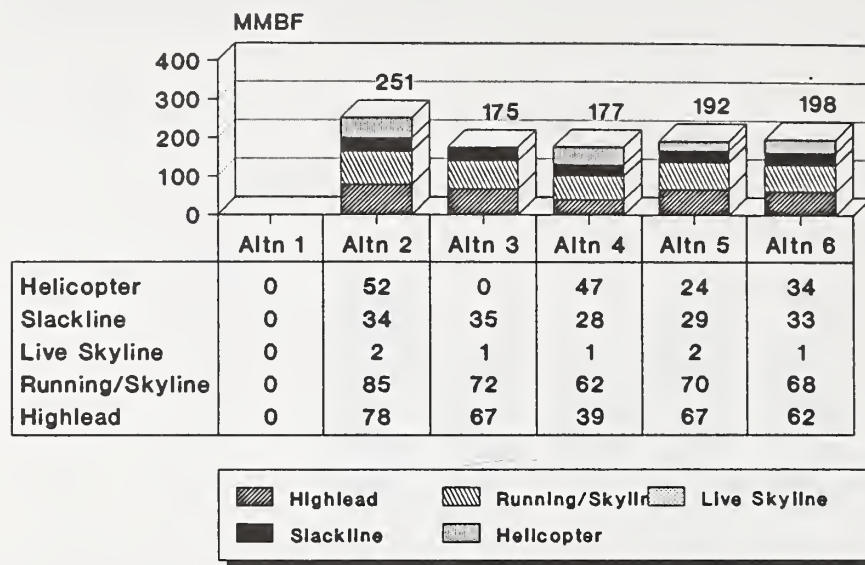
Comparison of Alternatives by Significant Issue

The comparison of alternatives draws together the conclusions from the materials presented throughout the EIS and provides the results of the analysis in summary form. This section compares the alternatives in terms of the previously discussed significant issues. The baseline for comparing alternatives is Alternative 1, the no-action alternative.

Issue 1: Timber Harvest Economics

Estimated timber economics focuses on the residual value (stumpage) of the timber after all associated logging and transportation costs are subtracted. Generally, the most expensive logging method is helicopter, followed by slackline, highlead, live skyline (shotgun), running skyline and shovel yarding. Yarding distance, uphill versus downhill yarding, volume per acre, species composition and value, in combination with other factors will influence the relative cost of each yarding method. Helicopter yarding is necessary in areas where it is impractical to build road or where aerial logging is necessary to meet specific standards and guidelines. Alternative 2 proposes the most helicopter volume (52 MMBF), while Alternative 3 proposes none. Figure Sum-11 compares the logging systems proposed for each alternative.

Figure Sum-11
Timber Harvest by Logging System



Based on the analysis of timber values in the Timber section of Chapter Three, only alternatives 3 and 6 show a positive net stumpage, with Alternative 6 having the highest value by a small margin. Table Sum-3 compares the economics of timber harvest in dollars/thousand board feet (\$/MBF) for each alternative under mid-market conditions (generally representing the average market condition and product mix, during the period from 1979 to the current quarter). The mid-market conversion expresses the net dollar value of the timber volume after subtracting the production costs from the mid-market log value including road, bridge and LTF construction costs. The table also displays the road, bridge and LTF costs in terms of millions of dollars (\$MM).

Table Sum-3
Estimated Mid-market Stumpage Value

Components	Alternative					
	1	2	3	4	5	6
Mid-Market Conversion Rate (\$/MBF)	0	-18.84	+16.03	- 4.63	-22.53	+17.50
Road, Bridge & LTF Construction Costs (\$MM)	0	29.4	17.9	17.8	24.8	17.3

SOURCE: Rhodes, 1993

* Costs included in the mid-market conversion rate

Issue 2. Fish Habitat and Water Quality

There is no measurable effect on water quality or fisheries production by any of the timber harvest or associated activities proposed by any of the action alternatives. All alternatives meet the requirements and intent of the Clean Water Act. Implementation of proposed fish habitat enhancement projects for each alternative could increase the habitat for fish production. Implementation of the TTRA's requirement to provide a minimum 100-foot buffer on Class I streams and Class II streams flowing directly into Class I streams would effectively mitigate direct stream channel impacts from proposed timber harvest and road construction. Adherence to BMP's outlined in the Soil and Water Conservation Handbook (USDA FSH 2509.22) during the design of units and roads will minimize the potential direct effects to fish as well. Site-specific BMP's were developed and selected to minimize the potential for impact to fish habitat. These site-specific BMP's are noted on the individual Harvest Unit and Road Design cards in Appendix K.

Fish habitat capability models are used to estimate the effects of timber harvest on the capability of streams to provide habitat for selected species of salmon and trout. Because there are many factors which influence fish populations—including commercial/sport harvest, oceanic conditions, and predation—these computer models provide only relative measures of habitat capability. These models indicate that there is no change in habitat capabilities for coho and pink salmon, or for Dolly Varden char, and the species which they represent, among the alternatives, including the no-action alternatives.

Every major watershed (VCU) within the Project Area has experienced prior roading and road construction. Re-entering these drainages may generate a greater potential risk for impacts on water quality, with the risk expected to be greater in those watersheds with the higher cumulative percents of harvest. The standards and guidelines associated with Alternative P of the TLMP Revision Supplement to the Draft EIS (TLMP Draft Revision 1991a) limit the amount of timber harvest within a given watershed to 35 percent of the total land base within a 15-year period. Table Sum-4 shows the existing, direct and indirects effects of timber harvest and road construction by third order or larger watershed.

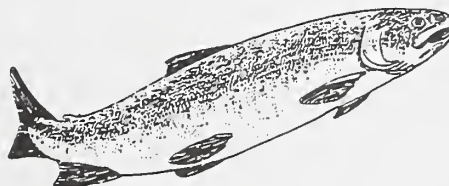


Table Sum-4

Cumulative Watershed Effects, Percentage of Watershed Harvested and Roded in Third Order or Larger Watersheds

Watershed Number	Watershed Harvested and Roded 1982-1997					
	Alt.1	Alt.2	Alt.3	Alt.4	Alt.5	Alt.6
C11A	0	10	3	3	11	3
C12A	0	12	12	12	5	12
C13A	7	5	2	5	4	5
C30A	0	4	2	3	3	0
C33A	0	0	0	8	0	8
C34A	0	12	14	13	8	16
C40C	0	0	0	0	0	0
C41B	0	10	1	11	10	2
C43A	0	3	0	20	23	0
C59B	5	8	7	0	8	9
C60C	5	9	8	2	5	7
D13A	6	4	2	6	6	2
D57B	3	13	8	9	10	9
D58C	0	17	6	1	4	1
D67A	0	0	1	0	0	0

SOURCE: Babik, 1993

Table Sum-5 displays the percent of high gradient contained stream channels (Channel types HC1, HC2, HC3, HC4, HC5, HC6) which have been harvested or proposed for harvest during the period of 1977-1997, in third order or larger watersheds. The Forest Plan Revision limits cumulative harvest rates in this land use designation to 25 percent or less every 20 years of a third order or larger watershed.



Table Sum-5

Cumulative Watershed Effects, Percentage of High Gradient Contained Process Group Harvested

Watershed Number	Process Group Harvested 1977-1997					
	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
C11A	0	10	4	4	14	4
C12A	0	16	16	16	5	16
C13A	12	16	0	16	14	15
C30A	0	0	0	0	0	0
C33A	0	0	0	13	0	13
C34A	0	19	18	25	0	18
C40C	0	0	0	0	0	0
C41B	0	5	0	7	5	1
C43A	0	1	0	15	25	0
C59B	9	15	13	15	14	16
C60C	12	17	13	14	15	17
D13A	9	10	11	16	16	11
D57B	4	16	12	12	12	11
D58C	0	10	8	0	0	0
D67A	0	0	0	0	0	0

SOURCE: Babik, 1993

Another measure of potential risk to fish habitat from timber harvest is the associated new road construction and road reconstruction which crosses streamcourses (see Chapter Three-Fisheries). During placement of culverts or bridges, sediment may be introduced into the streams which may have short- or long-term effects on water quality. Alternative 4 proposes the fewest stream crossings, while Alternative 2 proposes the most. This is shown in Table Sum-6.

Table Sum-6

Stream Crossings to be Constructed

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Class I	0	44	28	29	42	27
Class II	0	64	54	33	55	49
Class III	0	219	147	116	186	124
Total Crossings	0	327	229	178	283	200

SOURCE: Rhodes, 1993

Following timber harvest, there is an increased risk of landslides until second growth and the brush layer become firmly established. One way of analyzing this risk is to determine the amount of timber harvest on slopes which have high mass movement index (MMI) soils. This rating does not imply that such a mass-wasting event will occur; rather, it ranks the alternatives on the basis of the potential for a mass-wasting

event to occur, which may or may not result in an increase in stream sediment. This increased stream sedimentation may result in some loss or impairment of resident and anadromous fish spawning and rearing habitat. Table Sum-7 shows the proposed harvest on high MMI (MMI = 3) and very high MMI (MMI = 4) soils by alternative. Virtually all very high MMI soils have been removed from the base. Only those sites that appear to be small inclusions or mistyped have been retained in the unit pool. These sites will be examined by a professional soil scientist as part of unit layout.

Table Sum-7
Acres of High Hazard Soils Harvested, by Alternative

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Very High MMI soils	0	216	225	203	162	266
High MMI soils harvested*	0	4,047	2,317	2,833	3,158	2,162

SOURCE: Babik, 1993

* See Chapter 3-Soils for details of MMI classifications.

Issue 3. Recreation and Scenic Quality

There are 16 key viewsheds within the Project Area. The proposed visual quality objectives (VQO's) for this project establish the minimum visual quality management standards for these key viewsheds.

Table Sum-8 shows the proposed VQO's for each key viewshed, and the percent change in visual cumulative disturbance level by alternative. Alternative 1 represents the existing visual condition. In all viewsheds for all alternatives, the proposed harvest units achieve the proposed visual quality objectives.



Table Sum-8

Proposed VQO's and Changes in Cumulative Visual Disturbance

Viewshed	Proposed VQO*	Changes in Percent Visual Condition*					
		Alt. 1**	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Behm/Indian Pt	PR-M	0	0	0	0	0	0
Behm/Traitors	PR-M	0	2	3	3	5	3
Traitors Cove	M-MM	0	16	17	5	9	17
Margaret Cove	M-MM	0	21	12	8	9	9
Inner Traitors	PR-M	0	7	6	4	4	6
SW Neets Bay	PR-M	0	1	3	0	2	4
NW Neets Bay	PR-MM	0	11	10	9	5	10
Inner Neets Bay	M-MM	0	5	5	7	7	7
Head/Neets Bay	PR-M	0	10	6	11	11	6
Behm/Gedney Pass	PR-M	0	5	2	8	0	5
Shrimp Bay	PR-M	0	5	0	8	2	4
Klu Bay	PR-M	0	12	7	10	8	11
Orchard Lake	PR	0	0	0	0	0	0
Behm/W. Hassler	R-PR	0	7	9	7	2	10
Behm/N. Hassler	R-PR	0	13	11	17	10	12
S. Hassler Pass	PR-M	0	15	11	12	6	11

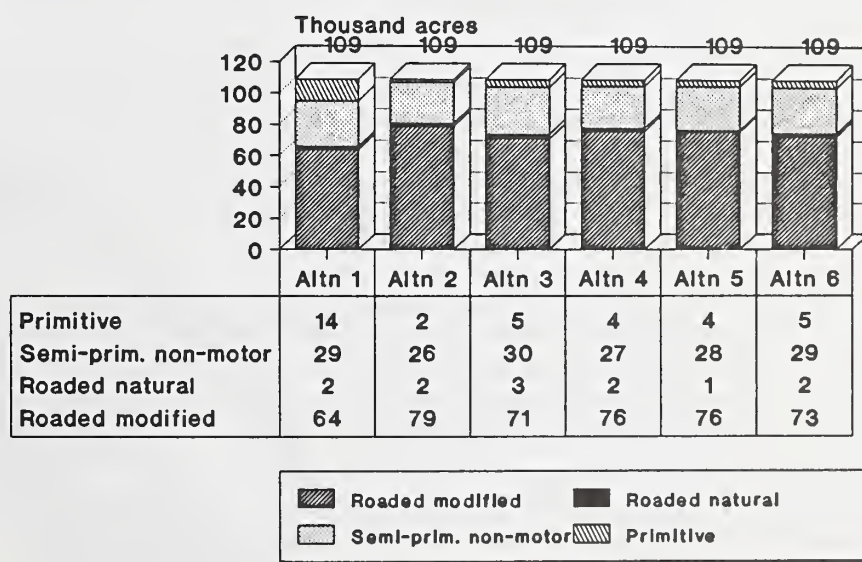
SOURCE: Angelus, 1993

* R = Retention; PR = Partial Retention; M = Modification; MM = Maximum Modification

** Alternative 1 represents the existing condition

Implementing any of the action alternatives will change the existing Recreation Opportunity Spectrum (ROS) class within the Project Area. Figure Sum-12 shows the change in ROS class by alternative.

Figure Sum-12
Changes in ROS Class, by Alternative

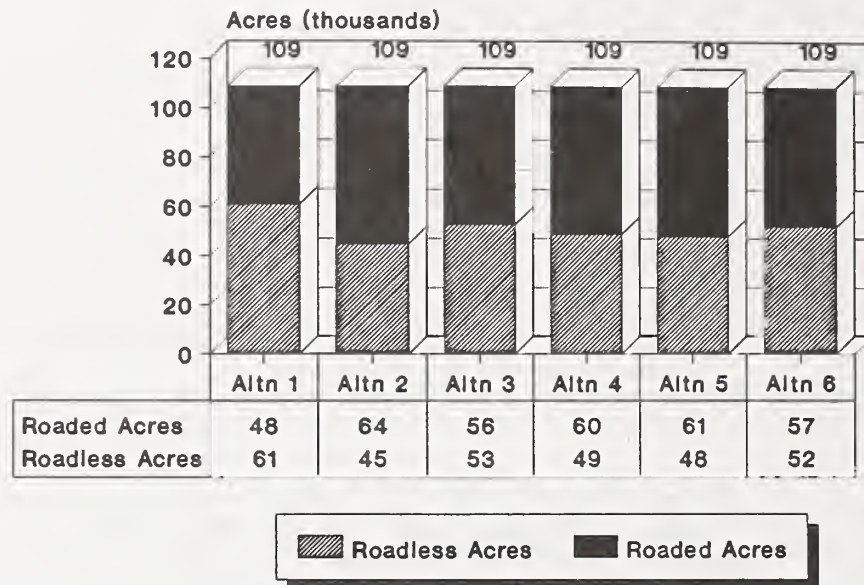


Summary

The TLMP Draft Revision (1991a) identified three roadless areas which lie within or partially within the Project Area. The impact of timber harvesting on roadless areas is much larger than the acres harvested because the sights and sounds associated with the harvest activity affect the surrounding area. Roadless areas generally need to be at least 5,000 acres in size, or the area is no longer considered roadless. Figure Sum-13 shows the number of roadless area acres that will remain after implementation of an alternative.

Figure Sum-13

Timber Harvest within Roadless Areas



Issue 4. Wildlife habitat

The major effect on wildlife habitats in all action alternatives is the reduction of old-growth forest habitat. Impacts to other habitats were reduced by the interdisciplinary design of units prior to alternative formulation. All alternatives result in impacts consistent with the implementation of the TLMP (1979a, as amended) and Alternative P of the TLMP Draft Revision Supplement to the Draft EIS (TLMP Draft Revision 1991a), standards and guidelines.

Table Sum-9 shows the potential reduction in wildlife habitat capabilities, as estimated by habitat capability models, for the key Management Indicator Species (MIS) found in the North Revilla Project Area. This table displays the 1954 long-term habitat capability and estimated short-term reduction in habitat capability after potential implementation of the alternatives.

Table Sum-9
Potential Changes in Habitat Capability within the Project Area for MIS in 1997

Species	Habitat Capability		Changes from 1993 by Alternative					
	1954	1993	1	2	3	4	5	6
Sitka b-t deer	3,206	1,700	0	-108	- 85	- 84	- 72	- 99
Black bear	187	144	0	-2	-1	-1	-1	-1
Otter	75	66	0	-1	-1	-1	-1	-1
Marten	160	144	0	-17	-13	-11	-12	-14
Hairy woodpecker	1,470	1,051	0	-177	-132	-118	-130	-142
Van. Can. goose	269	243	0	-24	-17	-16	-19	-19
Bald eagle	233	137	0	-2	-1	-1	-1	-1
Brown creeper	3,526	1,338	0	-207	-146	-133	-141	-160
Red squirrel	76,774	70,793	0	-7,579	-7,158	-7,043	-7,166	-7,253
Grey wolf	8	4	0	0	0	0	0	0

SOURCE: Matson, 1993

Note: Numbers do not incorporate patch size effectiveness calculations (see the Old-Growth/Biodiversity section)

Forest fragmentation represents a change in the overall forest landscape from large, contiguous blocks of old-growth forest to smaller blocks separated by timber harvest units. Increased amounts of forest fragmentation indicate reduced habitat potential for species which are thought to be dependent on interior old-growth forest habitat. One way to analyze forest fragmentation is to measure the reduction of large, contiguous blocks of old-growth forest, defined for this analysis as those over 1,000 acres in size, as a result of timber harvest. Extremely large blocks of old growth (Cleveland peninsula, Misty Fiords National Monument, and the Naha Roadless Area) are adjacent to the Project Area. The Orchard Lake area contains high volume old growth that is not scheduled for harvest under any alternative. In addition, the Project Area contains a significant amount of old-growth habitat in blocks over 10,000 acres in size. Table Sum-10 shows the number of acres of old-growth habitat in large blocks that will remain after implementation of an alternative.



Table Sum-10

Effect of Timber Harvest on Forest Fragmentation, in Acres

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Acres of lg., unfragmented blocks >1,000 acres remaining after harvest	3,460	8,625	9,353	10,154	7,463	10,118
Acres of lg., unfragmented blocks >10,000 acres remaining after harvest	49,505	31,184	34,716	33,241	34,585	32,997
Total Acres of Old Growth remaining after harvest	56,927	48,695	51,193	51,156	50,503	50,359

SOURCE: Matson, Nightingale, 1993

Issue 5. Subsistence Use

Chapter 3 evaluates the potential site-specific effects on subsistence that could result from implementing any of the proposed timber harvest and associated road construction alternatives.

The Tongass Resource Use Cooperative Survey (TRUCS) identified areas which are most heavily used by subsistence households. Based on the TRUCS, the Project Area contains no high or moderate use subsistence areas.

Deer hunting is one aspect of subsistence use affected by timber harvest. The Wildlife and Subsistence sections of Chapter 3 discuss the computer models used to estimate the effects of timber harvest on deer habitat capability—both long range and short range. Based on this analysis, Alternatives 1 will cause no reduction of deer habitat capability. Among the action alternatives, Alternative 5 would cause the least reduction to deer habitat capabilities (72), while Alternative 2 would reduce deer habitat capabilities the most severely (109) within the Project Area.

Table Sum-11 displays the number of deer the habitat in the WAA's (509 & 510) can support now and at the end of the KPC Long Term Sale (2004). The full WAA habitat capability has not been reduced for the effects of fragmentation.

Table Sum-11
Deer Harvest and Habitat Capability for WAA 509 & 510

Alternative	Habitat Capability Index		Population of Deer Needed to Meet Demand 1993
	1997	2004	
1	3,332	3,223	970
2	3,223	3,223	970
3	3,247	3,223	970
4	3,248	3,223	970
5	3,260	3,223	970
6	3,233	3,223	970

SOURCE: Matson, 1993

Note: Habitat capability for entire WAA's has not been reduced for fragmentation

The Project Area is located within portions of two wildlife Analysis Areas (WAA), 509 and 510. The harvest is 100 deer per year based on ADF&G hunter surveys for both complete WAA's. Approximately 970 deer are needed to support this level of deer harvest. Currently (1993) the two full WAA's provide habitat capability for 3,332 deer. The habitat capability through the year 2004 is projected to be 3,223 deer.

The analysis would indicate that none of the alternatives will cause a significant restriction of subsistence hunting or fishing at this time. However, based on the potential indirect and cumulative effects of timber harvest (due to a downward trend in habitat capability), there may be a significant possibility of a significant restriction of subsistence use of deer and some furbearers within the Project Area for all alternatives in the future.

Issue 6: Social and Economic Effects

The State of Alaska receives 25 percent of the sum of all net receipts from timber sold on National Forest System Lands plus any purchaser road credits. This money is earmarked for public school and road maintenance funding. Table Sum-12 shows the estimated returns to the State of Alaska and the Ketchikan Gateway Borough from the harvest of timber (from this project only) by alternative. Actual returns will be based upon scaled volumes and appraised rates and may differ from this estimate, which is based on mid-market rates.

Table Sum-12

Average Annual Returns to State of Alaska from Sale of Timber*

Alternative	Estimated volume (MMBF)	Total receipts (M\$)	State of Alaska returns (M\$)	Ketchikan (KGB) returns ** (M\$)
1	0	0	0	0
2	63	5,969	1,492	67
3	44	5,048	1,262	57
4	45	4,094	1,024	46
5	48	4,975	1,243	56
6	49	5,046	1,261	57

SOURCE: Somrak, 1993

* Based on mid-market rates and four year harvest rate (see Appendix A)

**Based on historical average percent distribution.

Table Sum-13 displays the employment (jobs) and personal income (salaries) associated with each alternative averaged over a four-year period. The jobs and salaries listed include those both directly and indirectly dependent upon the timber industry.

Table Sum-13

Timber Industry Average Annual Employment and Income (by Alternative)

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Volume Harvested						
Total (MMBF)	0	251	174	178	193	198
4 Year Avg (MMBF)	0	63	44	45	48	49
Employment (Jobs)	0	579	345	405	450	448
Personal Income (Millions \$)	0	17.5	11.9	12.2	13.6	13.5

SOURCE: Somrak, 1993

All Alternatives provide sufficient volume, in combination with other scheduled offerings, to meet contractual obligations to KPC and assist in maintaining timber-related employment in the region. In these alternatives, the total volume harvested ranges from 174 MMBF in Alternative 3 to 251 MMBF in Alternative 2. Alternatives 4, 5 and 6 provide 178 MMBF, 193 MMBF and 198 MMBF respectively. These volumes would be provided to KPC in harvest offerings that would meet contract requirements and maintain the volume needed to continue production.

Under Alternative 1, the no-action alternative, none of the employment described above would be supported by timber harvest activity in the North Revilla Project Area. This would result in a negative effect on local timber harvest employment should KPC not be able to substitute volume from another source. The effects of Alternative 1 are not predictable and could range from elimination of shifts to partial or even full shutdown of the KPC mill for an unspecified period of time. Selection of the no-action alternative could also have potential long-term ramifications to the contract holder, the core communities, and ultimately Southeast Alaska, through de-stabilization of the wood products industry. The projected long-term effects of different harvest levels are contained in the TLMP Revision Supplement to the Draft EIS (TLMP Draft Revision, 1991a).

None of the alternatives is expected to have a significant direct impact on the commercial fishing, recreation, and tourism industry, or related employment.



Issue 7: Marine Environment

Direct effects to the marine environment are assumed to occur only from development and use of LTF's, and are limited to the intertidal area affected by rock fill, and either the intertidal or subtidal areas potentially affected by accumulations of bark debris.

A total of 24 potential LTF locations were considered for possible development. There are 11 existing LTF sites and 13 potential new sites. The maximum number of LTF's that would be utilized under any alternative is 7 (1 new site and 6 existing sites), as there are 2 or 3 possible sites considered for each road system. The final selection of which LTF sites to utilize was based on the interagency guidelines (Alaska Log Transfer Facility Siting, Construction, Operation, and Monitoring/Reporting Guidelines). The U.S. Fish and Wildlife Service and the National Marine Fisheries Service staff conducted subtidal surveys at the sites that appeared to best meet the interagency guidelines. The subtidal survey reports and recommendations which are included as part of Appendix G, were used to further define which of the potential LTF locations was preferable. Table Sum-14 displays the LTF's involved in the various alternatives. See also the detailed alternative maps included with North Revilla EIS.

Table Sum-14
Log Transfer Facilities Required (by Alternative and System)

LTF Name	LTF Number	1	2	Alternative				6	LTF System
Hassler Island	2	N	I	I	I	I	I	I	A Frame
Klu Bay	4	N	I	I	I	I	I	I	A Frame
Shrimp Bay	5	N	I	I	I	I	I	I	A Frame
Chin Point*	7	N	I	I	I	I	I	I	Low Angle Ramp
Fire Cove	16	N	I	I	I	I	I	I	A Frame
SW Neets	17	N	I	I	N	I	I	I	A Frame
Margaret Bay	24	N	I	I	I	I	I	I	A Frame

SOURCE: Rhodes, 1993

I = Planned for intermittent use; N = Not planned for use. * New Log Transfer Facilities

Summary

Table Sum-15 displays the number of LTF's used or developed, the total acreage of the structural embankment, and the estimated acres to be affected by bark deposition. The combination of the marine habitat covered by the structural embankment and the area potentially covered by bark deposition represents the total loss of marine benthic habitat for each alternative.

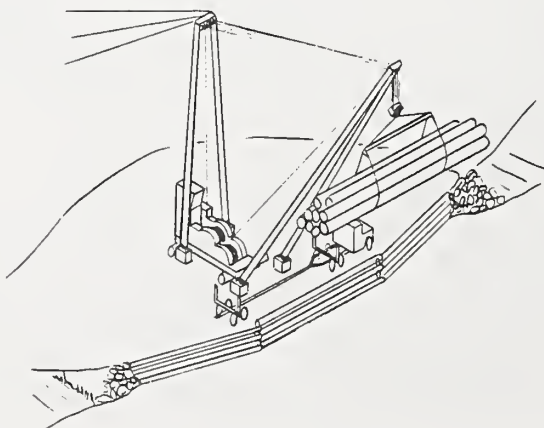
Table Sum-15

Marine Benthic Habitat Affected (by Alternative)

	Alt. 1	Alt. 2	Alt. 3	Alt. 4	Alt. 5	Alt. 6
Number of Sites	6	7	7	6	7	7
Structural Embankment (Acres Affected)	1.4	1.6	1.6	1.4	1.6	1.6
Bark Deposition (Acres Affected)	0	7.0	7.0	6.0	7.0	7.0
Total Acres of Marine Benthic Habitat Affected	1.4	8.6	8.6	7.4	8.6	8.6

SOURCE: Rhodes, 1993

The no action alternative has no additional effect on the marine environment, while alternatives 2, 3, 5, and 6 affect the marine system (8.6 acres) in a similar fashion, followed by Alternative 4 (7.4 acres) with a somewhat smaller impact. The loss of habitat is much less than one percent of the available marine habitat in the Project Area. Since all species identified along the subtidal (under water) survey transects are common throughout Southeast Alaska, it is concluded that there would not be a significant impact to the marine environment from constructing (or continuing to use) LTF's at the proposed sites.



Mitigation Measures

The Forest Service uses numerous mitigation and preventive measures in the planning and implementation of land management activities. The application of these measures begins during the planning and design phases of a project. They link to the overall Forest, Ketchikan Administrative Area, and Ranger District management direction and continue through all phases of subsequent forest management. The Standards, guidelines, and direction contained in the current TLMP (1979a), the Supplement to the Draft EIS for the TLMP Revision (1991), Alaska Regional Guide, and applicable Forest Service manuals and handbooks have been applied in the development of alternatives and design of harvest units and roads.

Public comment on the North Revilla Draft EIS was helpful in identifying when and where additional mitigation measures should be considered. Listed below is a brief summary of some of the mitigation measures common to all alternatives. Specific mitigation measures, as applied to each individual unit, can be seen in the "As Planned" Unit Layout and Road Cards. These unit and road cards are an important tool for implementing the project, as they list standards and guidelines and provide a mechanism for tracking project implementation. Unit and road cards have been developed for each individual unit, that occurs in an alternative, and appear in Appendix K (Volume II of this EIS).

Water Quality and Fish Production

Mitigation to protect water quality, fish habitat and wetlands includes application of the Best Management Practices (BMP's) stated in the Soil and Water Conservation Handbook (USDA FSH 2509.22). This handbook provides standard operating procedures for all stream classes. In addition, the TTRA mandates a *minimum* 100 foot buffer on all Class I streams and on Class II streams that flow directly into Class I streams. The width of this buffer strip may be greater than 100 feet for reasons such as topography, riparian soils, a windfirm boundary, timber stand boundaries, logging system requirements, and varying stream channel locations. In addition, certain Class III streams flow directly into or have been identified as influencing Class I streams. These Class III streams have been buffered to the slope break of the channel or to a windfirm boundary to protect water quality. Split yarding or full suspension was built into the logging and transportation design process, as was partial and full suspension over soils with a higher mass movement potential. Direct in stream impacts are minimized through road construction timing and fish passage requirements on certain Class I and II streams. Refer to Appendix K (Unit and Road Cards) for the unit specific stream buffering, suspension, passage, and timing requirements being applied. Application of BMP's and adherence to the TTRA requirements will protect water quality and fish habitat as well as riparian habitat important to other species such as deer, bear, and furbearers.

Wildlife

Mitigation measures to protect wildlife habitat are a part of the design of the alternatives include the location of the harvest units and road locations. Harvest units and roads are intentionally located away from important wildlife habitats (to the extent practicable) to reduce the effects on wildlife. Seasonal use of the Project Area

Summary

by wintering trumpeter swans and harbor seals (haulout and pupping areas) have been protected from disturbance by up to a half mile buffer zone during critical times of the year. Beach and estuary habitats are completely avoided by harvest units, while road incursions are minimized to the extent practicable. Where possible, disturbance of important travel corridors is minimized to allow the undisturbed movement of wildlife.

Other measures considered to mitigate impacts include road closures, grass seeding of roadbeds, retention of snags where safe to do so, and scheduling of harvest activities which reduce disturbance to bald eagle nesting and rearing activity. Goshawk surveys (vocalizations) have been conducted. If a goshawk or marbled murrelet nest site is located during the layout process it will be protected using the latest standards and guidelines.

Subsistence

Because most subsistence use involves harvesting fish and game, mitigation measures that protect or enhance fish and game resources will also protect and enhance subsistence activities. By placing units and roads away from beach and estuary fringe habitats, and away from salmon bearing streams, mitigation measures were built into each of the alternatives considered in the EIS. Additional subsistence concerns were incorporated into the alternatives to varying degrees.

Recreation

Effects of timber harvest on views from anchorages and known recreational day use areas will be reduced by leaving buffers of timber along the beaches and inland lakes. The proposed visual quality objectives for this plan emphasize the protection of the visual resource as viewed from saltwater, and Hassler Island and Orchard Lake in particular will reduce the direct effects on visual quality. Riparian management or stream buffers will protect fisheries habitat and sport anglers use of Class I and II streams in the Project Area.

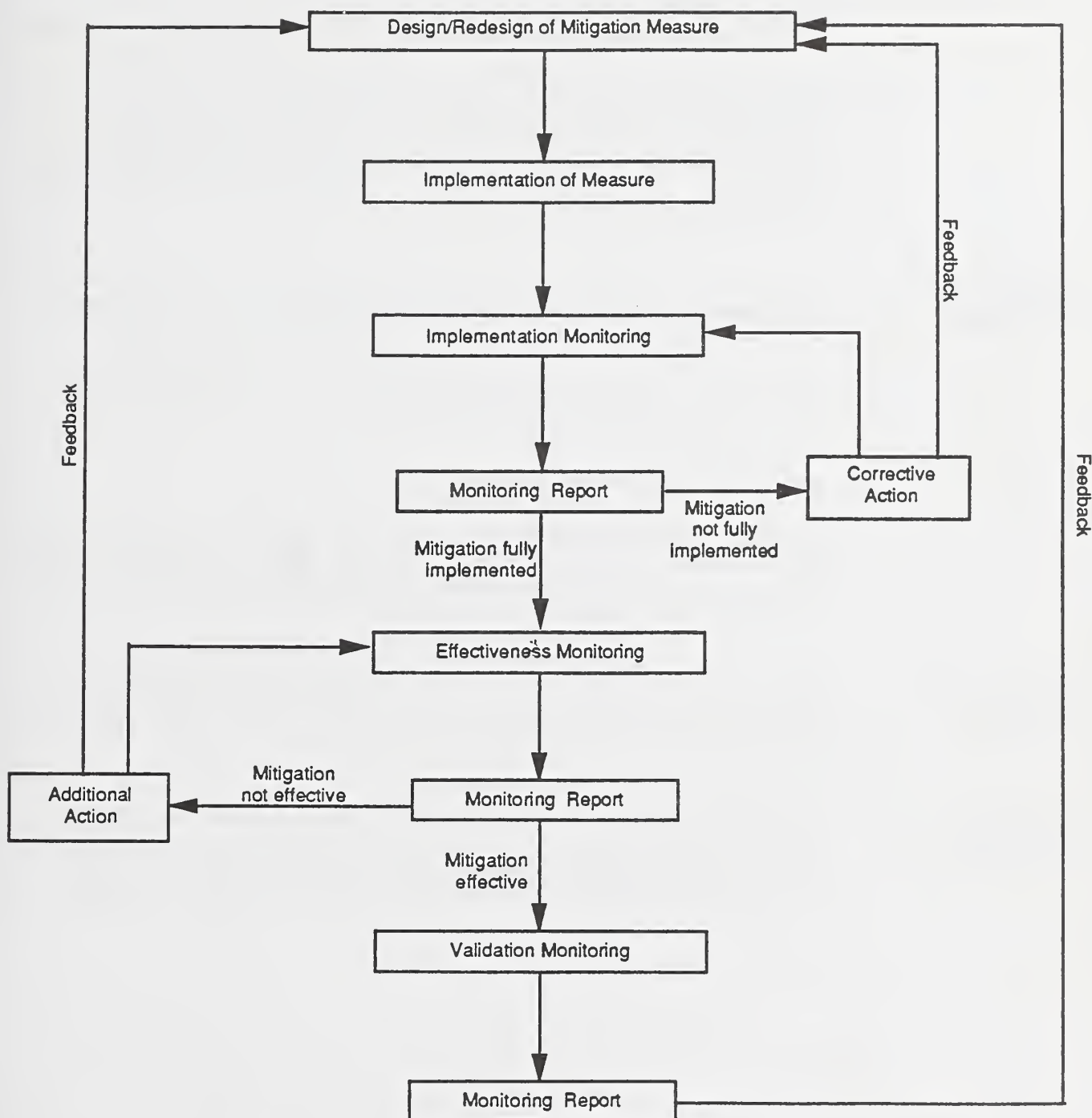
Cultural Resources



Potential effects on cultural resources can be minimized by excluding project activities from most high probability areas (exceptions are LTF's, camps, a small number of units, and access roads to these facilities). The high probability areas were all surveyed in 1992, except for exact road locations which cannot be precisely determined until after unit and road layout occurs. There are no known significant cultural sites located within any of the proposed harvest unit boundaries. If a cultural site is located, the types of mitigation measures include avoidance, protective enclosures, monitoring of harvest activities, restrictions on size or road location, and recovery and documentation of materials.

Mitigation measures are part of an iterative process that includes monitoring to determine if the practice was effective or needs to be revised. All mitigation measures are assumed to be completely effective when designed, applied and implemented properly. Monitoring is used to determine if that assumption is true, and if not, why not— and develop improved methods or additional treatments to insure that the mitigation will be effective in the future. Figure Sum-14 displays how the iterative process of mitigation and monitoring occurs. The design and application of mitigation measures, is monitored for implementation, effectiveness or validation of the mitigation. Monitoring reports are used to trigger additional action or as feedback to redesign and improve future mitigation measures.

Figure Sum-14
Mitigation/Monitoring Feedback Loop



Monitoring

Monitoring is designed to determine if the resource management objectives of the North Revilla Final EIS have been met. The results will be used to verify implementation and effectiveness of selected mitigation and protection measures in a timely manner. Three types of monitoring were recognized in the development of this monitoring plan and are described below.

Implementation Monitoring

Implementation monitoring assesses whether the project was implemented as designed and whether it complies with the Tongass Land Management Plan (TLMP, 1979a). Unit Cards (Appendix K) will provide the basis for determining whether recommendations were implemented for the various aspects of timber harvest. Implementation monitoring is part of the administration of a timber sale contract. The sale administrators and road inspectors assure that the prescriptions contained on the unit cards are implemented.

Best Management Practices

Implementation monitoring of water quality resources will largely consist of monitoring BMP's and Riparian Management Unit prescriptions. BMP's, as defined in the Region 10 Soil and Water Conservation Handbook (FSH 2509.22), are procedures designed to ensure protection of water quality and fish habitat.

Effectiveness Monitoring

Effectiveness monitoring seeks answers about the effectiveness of design features or mitigation measures in protecting natural resources and their beneficial uses. Monitoring records will be kept by the responsible staff.

Validation Monitoring

Validation monitoring is conducted to show if the assumptions or models used in planning are correct. It is usually carried out at the regional level in conjunction with research. Validation monitoring may or may not occur within the North Revilla Project Area since this type of monitoring is built into a Forestwide Action Plan.

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Front Cover— By Cindy Ross Barber, 1992. The design illustrates the range of interconnected issues addressed in this EIS.

USDA Forest Service— all photos USDA Forest Service except: page S-28, Leland Prater.

Ketchikan Gateway Borough, Planning Department; Atlas of the Ketchikan Region, 1978 — pp. S-11, S-22

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